the egg to the apple,' the Latins being accustomed to begin their dinners with hard-boiled eggs, and to end them with apples (a custom which is still preserved among numerous Italian families)."

It is clear that a theorist who can thus turn the practical sense of his own dinner-table into mythological nonsense about sky-hens and sun-eggs, is no fit guide to students of Comparative Mythology. But his book will be useful to those who can profit by his learning and ingenuity, without being misled by his fantastic extravagance.

OUR BOOK SHELF

The Year-Book of Facts in Science and Art: exhibiting the most important discoveries and improvements of the past year in mechanics and the useful arts, &c. By John Timbs. (London: Lockwood and Co., 1873.)

WE are glad to notice in Mr. Timbs's annual volume an improvement in some of the points in which last year we called attention to very serious deficiencies. There is a more copious reference to the original authorities, though this is still too frequently withheld, and the statements thus deprived of all scientific value; and the references are in general to more trustworthy sources. There is also a sensible diminution in the number of glaring errors of the press, which have been so conspicuous a feature in earlier volumes. The compilation shows, as does everything from the hand of the same editor, unwearied industry; but with all that a lack of the power of distinguishing the worthless from the really valuable. Many of the paragraphs belong unquestionably to the former category, and it is difficult to see what purpose they serve except that of "padding." On the other hand some really important discoveries or applications of the year are altogether unnoticed. Considerable further improvement will be necessary before "Timbs's Year-book" becomes either an adequate or a trustworthy record of the scientific events of the year. The portrait of Dr. Carpenter given by way of frontispiece is exceedingly good.

Das Leben der Erde. Blicke in ihre Geschichte, nebst Darstellung der wichtigsten und interessantesten Frazen ihres Natur-und Kulturlebens. Ein Volksbuch von A. Hummel. (Leipzig: Verlag von Friedrich Fleischer, 1872).

Physikalische und chemische Unterhaltungen. Ein Volksbuch von Dr. Otto Ule und A. Hummel. (Leipzig: Verlag von Friedrich Fleischer, 1873.)

TILL the publication of Hummel's "Leben der Erde" there were scarcely any popular scientific works published in Germany, which may seem strange, seeing that that country has claimed, probably with justice, the intellectual leadership of the world for many years past. It is possible there is less need for popularising the results of science in Germany than in England and France, seeing that the German system of education is so thorough and comprehensive. Germans also have a greater tendency to go about everything in a systematic way; and this is shown with great force and clearness by Mr. Matthew Arnold to be especially the case in their educational organisation, which discourages the acquirement of knowledge in an irregular and haphazard way. In this country again, as well as in France, "the people" generally make their first acquaintance with subjects in which the German people are grounded when at school, long after they have left school from popular scientific treatises. These two works are constructed on somewhat the same plan as the well-known French works of Flammarion, Guillemin, and Reclus, and appear to us to be well and often eloquently written, and so far as we have been able to test them, are accurate and wonderfully full. In the second the authors aim at giving every-day illustrations of physical and chemical laws, and at showing their practical and economical bearings. They divide it into four sections:—1. General phenomena of motion as applied to solid, liquid, and æriform bodies. 2. Sound, light, and heat. 3. Magnetic and electric phenomena. 4. Chemical phenomena. Hummel's *Leben der Erde*, we should think, would be the more popular of the two, both from the subjects treated of, the greater picturesqueness of language, and the greater abundance and attractiveness of the illustrations, some of which are very fine, though on the whole, not so well executed as such illustrations generally are in corresponding English and French works. He endeavours to show the relation of the earth to other heavenly bodies, gives its geological history, describes its physical geography, including the phenomena of land, water, and air, and concludes with a very eloquent account of the organic life of the earth. On the whole, both works seem to us very creditable to their authors.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

Agassiz and Forbes

THE letter from Mr. Alexander Agassiz, published in last week's NATURE, revives an attack which was made by Agassiz and Desor more than thirty years ago. It was then promptly met. (See Forbes's "Historical Remarks on the first Discovery of the real Structure of Glacial Ice," Edin. New Phil. Journal, 1843.) I possess correspondence which abundantly shows that the scientific world (English and Foreign) was thoroughly satisfied with the answer given by Forbes. Much of this correspondence can, if necessary, be published. But the reply given at the time, and which I am confident will satisfy any unprejudiced person, may be found *in extenso* in Appendix B to the "Life and Letters of James David Forbes" (Macmillan and Co., 1873). No answer was ever attempted by Mr. Agassiz to the paper in question, and the facts it contains could not have been allowed to pass by him unchallenged, had they not been accurately given. Mr. Alexander Agassiz may never have read the original paper. The date of his letter shows that he cannot have seen the reprint in the Life of Forbes.

This impeachment of Forbes's character by Mr. Agassiz (made, I willingly grant, with the best motives, and in ignorance of the details of the case) demands an explanation. I am aware that few would give credence to imputations of dishonesty in Forbes's character; but the matter is also of historical interest, and deserves an historical examination. I will therefore, with your permission, lay before the readers of NATURE next week the facts from which they shall judge whether the assertions in Mr. Agassiz's letter are supported by the evidence, or not.

Blackheath, May 10 GEORGE FORBES

Venomous Caterpillars

IN Mr. A. Murray's paper on venomous caterpillars in NATURE of May 1, I observe that in discussing the distinction between the terms poison and venom, he says in reference to the action of snake poison:—"It is said that you may swallow the venom of the rattlesnake with impunity, and I imagine you may, if it does not get absorbed through the mucous membrane; but Dr. Fayrer's experience, lately published, of the effects of the semi-swallowing, which occurs in extracting the venom from a poisoned wound would rather seem to show that such extremely virulent venom would penetrate the mucous membrane and act as if actually introduced by a wound, his throat having become dangerously ulcerated from sucking the poison from the wound of a man bitten by a cobra."

If Mr. Murray will refer to my investigations on this subject, he will find that snake poison produces the same effect when applied to a mucous membrane, and introduced into the stomach, the eye, the intestine, or applied to the exposed surface of a muscle or peritoneum, though not so rapidly as when injected directly into the vascular system. The idea that it may be swallowed with impunity being quite incorrect. But I must

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disclaim (having no title to it) the experience he assigns to me in reference to the dangerously ulcerated throat, never having made myself a martyr to science by so experimenting in *propria persona*. I have no doubt, however, as I have elsewhere stated, that this method of treating a cobra bite would not be devoid of danger to the operator.

As to venomous caterpillars. There is one much dreaded by sportsmen in the Himalayan Terai. It is said to be apt to fall from the trees on to persons passing or resting beneath their branches, and causes great irritation of the parts with which it comes in contact, amounting, I have been told, in some cases to erysipelatous inflammation. It is a moderate-sized, dark-coloured, hairy caterpillar, and known (I believe) in those parts of the Terai where I have been, as the *komla*. I have never seen it, but during my tiger-shooting expeditions into the Terai, it was always one of the probable inconveniences to be looked for in a camp in the tree jungle. I have heard many stories of the painful and irritating effects of contact with this creature, whose hairs are said to cause those results not only by breaking into but by also inoculating some irritating secretion into the skin.

London, May 4 J. FAYRER

I HAVE just read with interest your report of the paper on "Venomous Caterpillars," which appeared in your last. Towards the end of the report Mr. A. Murray refers to a hairy caterpillar which he received from Brazil, and remarks that "if the caterpillars have a special venom, then, as in the nettle, there should be a gland at the base of each hair, which should be hollow." I think I know the caterpillar to which he refers, and if I am right, its hairs are not exactly venomous, but produce a considerable amount of irritation in the skin. When in Brazil in 1859, I collected some of these caterpillars. They are very similar in appearance to the larvæ of the British Arctia, but when their hairs are examined under a microscope, they are found to consist of a series of barbed points, the point of each succeeding barb fitting into the divergence of the preceding barbs; at least, that is my recollection, for I have not examined them since then, and cannot find any specimens to do so now. The caterpillar is called in Maranham, "largata de fogo," that is, "fire caterpillar." After these hairs have afforded their protection to the caterpillar during its life, it carefully removes them from its body and weaves them in its cocoon, so that the pupa is thus as safe from intruders as the larva itself was. When a child, I recollect that Maranham was occasionally visited by great numbers of a particular kind of moth, the dust of whose wings produced a very great irritation on the skin, the least touch of one being sufficient to render you miserable for the rest of the evening. I perfectly remember a drove of these putting a quick temination to a small dance at home, as you may easily conjecture that ladies in evening costume are not well protected against such visitors. When in Maranham in 1859, I heard that these moths had not been seen there for many years. I believe their visits were during the rainy season. Some of the British Bombices, *B. quercus*, for example, and some of other genera, are said to possess irritable hair. But in *B. quercus* the hairs are not barbed, and, not being an entomologist, I can give no information respecting the others. HENRY S. WILSON

Anatomical School, Cambridge, May 5

On some Errors of Statement concerning Organ-pipes in Recent Treatises on Natural Philosophy

THAT our best teachers of science, both in their books and lectures make statements which are erroneous in fact, and inferences which are misleading whenever they touch upon the subject of wind instruments is not a little surprising, considering that intellects so highly trained hold in aversion any approach to inexactness, and the strangeness of it is that the errors arise through an ancient human custom, now supposed obsolete among philosophers, of "speaking without knowledge."

The evidence, if tendered, would fill some few pages of this paper, and if names were appended to the quotations the list would include authors most esteemed and honoured.

To cite two instances among many—and they are from works of unquestioned value and authority, and supposed to bring down sciences to the latest date—in the recently completed translation by Prof. Everett of Prof. Privat-Deschanel's "Natural Philosophy," the following passage occurs in explanation of the organ-pipe:—"The air from the bellows arrives through the conical tube at the lower end, and before entering the main body of the pipe has to pass through a narrow slit, in issuing from which it impinges on the thin end of the wedge placed directly opposite, called the lip. This lip is itself capable of vibrating in unison with any note lying within a wide range, and the note which is actually emitted is determined by the resonance of the column of air in the pipe." In another equally valuable work, the "Physics," by Prof. Ganot, translated by Prof. Atkinson, this description is given respecting the free-reed—"the tongue which vibrates alternately before and behind the aperture, merely grazing the edges as seen in the harmonium, concertina, &c., such a reed is called a free reed." Four professors responsible for statements so perversely at variance with facts that it is not possible either writer can have even attempted to ascertain, still less to demonstrate that the facts are as asserted. Practical experience affirms that the lip of the organ-pipe does not vibrate; press it with your hand or hold it in a vice to deaden the assumed vibration, and you will not alter one iota of the pitch of the sounding note: that the free-reed does not in its vibration "merely graze the frame;" it would be fatal to its proper speech if it did, and its vibrations would be checked in a jarring rattle. The facts are too simple to need argument; all that was required was observation.

When Ganot, describing a metal free reed, affirms as a law that when the force of air is increased the pitch of the reed rises, his statement is inexact, for it depends entirely on the accident of taking up a reed more or less rigid in proportion to scale, whether the experimentalist shall prove his assertion or prove the reverse. In the harmonium, of a set of five octaves of reeds, half will go more or less sharp, and half will go more or less flat, as the force of wind is increased, a fact which, if more generally known, might induce players to mitigate some of the insufferable harshness and jangling inflicted on listeners. That "a sharp edge" is essential to the functions of the flue organ-pipe is one of the commonest errors entertained by philosophers, and it forms the groundwork for whole pages of false theory. In treatise after treatise it is stated "the air is driven against the sharp edge," "is split upon the sharp edge, and by concussion caused to proceed intermittingly," "the air strikes the sharp edge," "is divided," "is lacerated," "strikes against the upper lip, and a shock is produced which causes the air to issue in an intermittent manner." Another equally common misstatement, and important because so strongly influencing theory, is that "a closed pipe gives a note an octave in pitch lower than an open pipe of the same length; the length of a closed organ-pipe is one-fourth that of the sonorous wave it produces in the air." Proved facts give different results. At my hand this morning there stood a sounding-pipe perfect in finish, its lip quite blunt, by measurement at the edge half an inch in thickness; and whole ranks of pipes were there in various grades of conformation, showing that the sharp edge was immaterial to the functions of a speaking-pipe. Sometimes the chamfering of the lip is desirable, sometimes not, and the builder decides according to the quality and character of each stop. The art in "voicing" a pipe consists in so directing the stream of air that it shall avoid striking the lip, and shall smoothly glide past without shock or noise, or concussion; you get no tone until it does. Actual experiment will show that a closed pipe gives a note only a major seventh below the note it gives as an open pipe, not an octave below; indeed, in the higher range of pipes it will be a whole tone short of the octave, to sound which the pipe would need to be made considerably longer. As having some significance in connection with this, it may be mentioned that there is in an open pipe, whilst sounding, a centre of equilibrium of pressure; it does not occur, as supposed, at the true half of the length, but somewhat below that division; as evidence, take the Flute Harmonique, when desiring to strike the node, it will always be found below the half. Further, as to length. If the open diapason pipe beside me, giving as fine a tone (CCC) as musician can desire, measures 14 ft. 10 in. in length, and its corresponding sound-wave claims 16 ft. or nearer 17 ft., the wide divergence merits better investigation than it has hitherto received. The experiments of Regnault and Seebeck are highly important to this question, but do not reach the conditions pressing for explanation in a speaking organ-pipe. To attempt to demonstrate the laws of organ-pipes with a tuning-fork is as inconclusive as sending galvanic electricity through a dead body and calling the movement life.

There is little difficulty in understanding how it happens that errors respecting wind instruments arise and are perpetuated. Experimental philosophers are occupied with the weightier matters of science, are rarely musicians or familiar with wind instru-

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